Hamilton, Ont. Board of Education.

Technological studies in Hamilton - a long-range plan

1986-1987

administrative report

#8

MONTH- November, 1986

TOPIC- TECHNOLOGICAL STUDIES IN HAMILTON - A Long-Range Plan

CONTACT- Mr. Frank Kelly, Area Superintendent of Education

RESOLUTION- RECEIVED FOR INFORMATION

THE BOARD OF EDUCATION FOR THE CITY OF HAMILTON

Serving Today - Building Tomorrow

Education Centre
100 Main Street West
Hamilton, Ontario
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1986 11 04

To the Chairman and Members
Education Management Committee
Hamilton Board of Education

Ladies & Gentlemen:

RE: TECHNOLOGICAL STUDIES IN HAMILTON -- A LONG RANGE PLAN

Attached, for your information, is a report on Technological Studies in Hamilton. It contains background, rationale, statement of purpose, directions and a five year plan. It is anticipated that, at the December meeting, specific recommendations concerning the first, and ensuing years of the plan will be placed before the Board.

RECOMMENDATIONS:

THAT THIS FIVE YEAR PLAN BE RECEIVED FOR INFORMATION.

Prepared by: L. Aurini, Technological Studies Supervisor
F. Kelly, Area Superintendent

Submitted by: C. G. W. McKague, Superintendent of Curriculum & Special Services

Approved by: A. J. Krever, Director of Education

TECHNOLOGICAL STUDIES IN HAMILTON - A LONG RANGE PLAN

SUMMARY

The following is a summary of the detailed report.

RATIONALE: Technological Studies must meet the needs of all students, male and female, and provide avocational opportunities, courses leading to post-secondary education and training for employment and apprenticeship. This report has considered the present shop facilities in Hamilton schools, the provincial changes in education, current staff, developments in new technology and the area job market.

PROGRAM: The curriculum design includes the offering of a core program[1] in each composite school, exploratory shop rounds[2] in grade 9, single credits in each core subject area in grade 10, single or double credit offerings in grades 11 and 12. Senior specialities will be limited per school and dependent upon the numbers of students selecting that specialty in each case. A host school format will be used to develop intensive programs.

MODIFICATION FROM PRESENT PROGRAM: The new program design will broaden the exploratory nature of grade 9 and keep it more in line with the student experiences in industrial arts in grade 8. It will make allowance for direct entry into grade 10. It will reduce the specialization emphasis in grades 11 and 12 by offering single credit and doubles on a more limited basis. It will develop program specialization in certain host schools[3] and provide equipment and staff to support this format. At the same time, almost 30 present courses are removed from program.

EQUIPMENT UPGRADING: It is recommended that some present equipment be relocated according to need. A review is uderway to determine minimum standards needed in composite schools, vocational schools and industrial arts shop areas. The plan proposes to add robotics trainers, C.N.C.[4] lathes, pneumatics trainers, Auto C.A.D.[5] equipment for drafting, engine analyzers for auto shops, logic trainers for electronics and a frame straightener for auto body shop. Additional woodshops will be supplied according to need. There is a proposal for the addition of multi-purpose shops in keeping with the objective to meet the avocational needs of students. A full review of the needs of vocational and industrial arts facilities is planned.

STAFFING: A staff professional development plan starts in year one and continues through to year five. It is aimed at updating staff experience with industry and will involve courses and information sessions.

It is recommended that this board contract a maintenance millwright to coordinate maintenance and repair of shop equipment and machinery.

IMPLEMENTING THE PLAN: It is proposed that the five year plan begin in 1987 and that the costing of the plan be spread over the five budget years. It is also proposed that the financing and direction of the plan be reviewed each year at a board meeting.

An explanation of terms used in this report follow:

Definitions:

1. **Core program:** refers to the courses offered at the intermediate division (grade 9 and 10) in a specific school. The core will vary from school to school as it depends on the facilities available at the school. Core

.../2

will be at least four courses (automotive, drafting, electricity and machine shop, other possible courses could be plumbing, refrigeration, and woodworking).

2. **Shop rounds:** refers to a package of three to four courses grouped together to form a single credit. This grouping could vary from school to school as it is based on the core program at a particular school.

3. **Host school:** refers to a school which offers a special program or concentration of courses. This program will be timetabled to allow students from outside the school's attendance area access to the program. The intent is to offer special programs in defined schools, thus providing opportunities within the system for students to access a specialization.

4. **Computerized Numerical Control (C.N.C.) lathe:**

   refers to a metal turning lathe which automatically performs machining operations programmed into a computer. This is part of the new high technology referred to as computerized assisted manufacturing (C.A.M.). These machines are small training lathes which perform the basic operations of an industrial size C.N.C. lathe.

5. **Computer assisted design (C.A.D.):**

   refers to a high-tech computer controlled drafting system which can be programmed to develop two and three dimensional drawings. These units offer similar capabilities as industrial systems.

PREAMBLE

As society changes, so must its educational system. As new technologies become dominant in business and industry, it is the obligation of the schools to keep pace and to provide students with experiences which will equip them for entry into career training, as well as with basic skills and knowledge that they will need to manage modern lifestyles. The students in our schools now face a world in which change is rampant and they must find ways of coping with this growing phenomenon. Technological Studies should be and must be a significant part of our curriculum in secondary school as it has a major role in the design and maintenance skills needed in our Hi-Tech society.

Within the framework of our modern society and to meet the needs of the young people of the Hamilton community, a plan for technological studies has been developed which will:

- provide opportunities for avocational and personal use of technology to carry into a lifestyle
- provide technological knowledge and skills for post-secondary education
- provide technology specialization where needed for direct employment and apprenticeship to meet the anticipated demand for skilled labour in our industrial community

The following pages outline a five year plan aimed at meeting these objectives.

TECHNOLOGICAL STUDIES IN HAMILTON: A LONG RANGE - FIVE YEAR SYSTEM PLAN

BACKGROUND

The decline in enrolment in Technical courses in composite secondary schools over the past few years has been a major concern. An administrative committee was struck in 1984 called the Technical Education Review Committee, T.E.R.C.. The mandate of this committee was to analyze the status of technical education in Hamilton and make recommendations in regards to future directions. The focus was primarily on the composite schools.

This initiative was taken in response to the Ministry of Education directive that boards "develop a board plan for technological studies".

The Technical Education Review Committee made an interim report to the Board in June of 1984 at which time the statement of purpose for Technological Studies in this board was accepted. * The final report was submitted in June of 1986 to the officials. (see Appendix A). The report contains 28 recommendations pertinent to changes in curriculum, school program, staffing, equipment, student selection and facilities. It should be noted that several recommendations were necessary to bring programs into line with O.S.I.S. direction. These have now been completed.

In the fall of 1985 another system committee, The Program Consolidation Committee, was formed to review course offerings in composite schools. This committee reported to the Board on October 9, 1986. Some of the recommendations of this committee have had a direct bearing on program in Technological Studies.

In the summer of 1986 the Director of Education and the Superintendent of Curriculum and Special Services directed the Supervisor of Technological Studies to develop a long range plan which would address the recommendations in the T.E.R.C. report and provide direction for technological studies in Hamilton. This fall, the Supervisor has worked with department heads to establish a set of directions and guidelines to implement change in the schools when a long range plan is approved.

* A full copy of the T.E.R.C. report is available from the Supervisor of Technological Studies

RATIONALE

In order to implement a coherent and relevant strategic plan, it is imperative to have a system-wide rationale for technological studies. This rationale must focus on the present needs of the system and the community, as well as the projected future needs and requirements. Due to the rapidity of technological change and the difficulty of predicting too far into the future, the long range plan should not extend beyond five years and should be reviewed at the end of each phase (year) of the plan.

This plan is based on the premise that each composite school should offer a core program in technological studies at the intermediate level with specialized programs in designated area schools at the senior level. This is more specifically delineated in the section on directions.

A number of key issues influenced the development of this plan. One of the most significant issues was the close proximity of the system's schools thus allowing for relative ease of student accessibility between schools. Another consideration was the large industrial base of the Hamilton community and the nature of program and proximity of Mohawk College. Other issues considered were as follows:

- The new curriculum guidelines for technological studies which are to be phased in over the next few years

- The changing technologies and integration of "hi-tech" such as CAD/CAM

- O.S.I.S. and the changing focus and emphasis of technology courses towards post-secondary education and personal use

- The present equipment and facilities of Hamilton schools which were planned to accommodate the Robart's Plan of the early 1960's

- The age of the technical teaching staff as projections indicate that 60% of our present staff in technical subjects can retire in the next 4-5 years

- The projections and reports of groups such as the Canadian Manufacturers Association who state that:

    - North American Industry is far behind that of Europe and Japan in implementing hi-technology, and Canada is 50% behind American companies. However, industry is aware of this and starting to progress into hi-tech

    - Hi-tech will create jobs in service and repair, not eliminate jobs, as many feared

    - There will be a dramatic shortage of skilled workers by the mid 1900s, due to retirement and lack of present training for young workers. West Germany is predicting similar problems. Industry and government are slowly becoming aware of this problem and hopefully will address it in the near future by opening employment opportunities for our youth

PLEASE NOTE: - The H.I.T.A.C. apprenticeship program at Mohawk College presently is at the saturation point and is unable to fill the needs of local industry

Taking all these issues into consideration, our schools should plan and prepare to meet the needs of our students and the comunity by providing opportunities in our technology programs for all students, both male and female. This long range plan addresses these issues.

GOALS

The foundation of any planning must be based on established philosophy, values and goals. This plan is based on the general goals of education of the Ministry and the Hamilton Board (see summary Appendix B). It is also based on the aims of technological studies as stated in the curriculum guidelines - Intermediate and Senior Divisions, 1985.

STATEMENT OF PURPOSE FOR TECHNOLOGICAL STUDIES IN HAMILTON (Received by the Board, June 1984)

FOR ALL STUDENTS, MALE AND FEMALE:

To develop useful generic skills (psycho-motor, cognitive, affective) through experiential learning. This purpose equally includes both:

- *The exposure to the wide variety of Technical subjects as one means of assisting the student in establishing future career aspirations, and*
- *The development of basic avocational skills which will provide base for future leisure and hobbies and future home maintenance competencies.*

To develop an understanding of, a positive attitude toward, and a respect for:

- *Work*
- *Good safety habits*
- *Co-operation with fellow workers and superiors*
- *The place of technology in fostering aesthetics*
- *Pride and satisfaction in the creation of excellence through quality workmanship.*

AS WELL, FOR SOME STUDENTS, MALE AND FEMALE:

To prepare for future occupations and further education by concentrating their studies in a specific field of Technology.

To prepare for future occupations and further education by exploring various fields of Technology.

To provide experience, in the Senior Division, in the new Technologies in such general and/or advanced level courses as:

- *Computer Assisted Design (CAD)*
- *Computer Assisted Manufacturing (CAM)*
- *Computer Technology*

DIRECTIONS:

It is our position that each composite school should provide a core technological program. Every school, however, should not necessarily provide the same program. The intermediate division program should be exploratory in nature, providing shop rounds * at grade 9 and single exploratory credits at grade 10. The senior division program should vary from school to school. Each school should define its program strengths based on interest, facilities and strength of program. Specific schools should offer concentrated specialized courses in defined subject areas. These specializations could be called "area programs" and be open to all students from any school. Also the possibility of integrated technical courses offered in a multi-shop facility should be explored and offered on a pilot basis.

The plan, outlined here, over the five year period will provide for:

1. The optimum use of our present facilities and equipment
2. The streamlining and consolidation of program to build on the current strengths of our Technological Studies programs
3. The updating of program, facilities, equipment and staff to meet the needs of our students and community.

A summary of the directions is as follows:

General Directions

- Each composite school will provide a core technical program
- Schools in an area should provide specialized programs to meet the system's needs
- A core program for each school will be established at the intermediate division (4-6 courses offered as exploratory rounds)
- The senior division program will be streamlined and specialities may vary from school to school
- School timetables should be co-ordinated to provide the opportunity for students to move to a "host school"
- Course codes and content must be consistent in the system
- Minimum equipment standards will be defined for each subject area

* shop rounds - Grade nine courses consist of a package of three to four of the following: automotive, electricity, drafting, machine shop, woodworking, plumbing, refrigeration

- There will be an on-going analysis of facilities and program in our schools

- Schools will explore the possibilities of offering an integrated technological studies facility at the senior division

- Surplus equipment will be relocated where needed

- A professional development program will be initiated to update teachers

Specific Directions

- Each school will define a core program

- Each school will define the specialized program at the senior division, allowing for a phase in period

- The intermediate division program will feature exploratory shop rounds at grade 9 and single exploratory credits at grade 10

- At the senior division:
  - single credits may be all or part of the core program
  - double credits or concentration only should be offered as part of the core program. Some schools may offer no doubles, others one to three; however, no school should offer all courses as doubles. *

THE STRATEGIC PLAN - 5 YEARS

The plan will be phased in over a five year period with a review at the end of each year. If approved, the plan will cost the board approximately 1.4 million dollars. The first year of the plan will meet the immediate needs of the system.

The following is an overview of the long range plan.

1. Year I estimated cost $280,000.00 (see Appendix C)

   Components:

   - introduction of hi-tech equipment on a limited basis using training models at approximately 25% of the cost of industrial equipment

** - initiate the replacement of equipment to meet the needs of program and students

   - begin identifying and relocating "functional" surplus equipment

* Double credit is the offering of two credits in a specific subject at grades 11 and 12.

- begin consolidation of programs
- up-dating and in-service of staff
- hiring of a maintenance millwright on contract (Appendix D)
- initiate the use of multi-purpose shops
- phase in junior wood shops in schools which have no wood shop facility (1 school)
- initiate a needs assessment of the Industrial Arts program at the Middle Schools
- constitute a Technical Advisory Committee (TAC)

2. Year II - estimated cost $280,000.00

** . continue introducing hi-tech training equipment such as C.N.C. milling machines

** . continue to rebuild, replace and upgrade equipment as needed

** . initiate update of middle school industrial arts equipment and facilities (dust collectors and computer assisted programing)

- Junior woodshop facility (2 schools)
- continue relocation of surplus equipment
- implement "new" curriculum based on Ministry Guidelines
- consolidate and streamline programs
- initiate review of delivery of basic level programs
- initiate delivery of specialized programs in defined schools
- on-going in-service of staff

3. Year III - estimated cost $280,000.00

- continue update for industrial arts

** . continue to rebuild, replace and upgrade equipment as needed

- on-going in-service for staff
- Junior woodshop (1 school)

- equipment and facilities for specialized programs in defined schools
- continue implementation of new guidelines
- initiate implementation of basic level program review

4. Year IV - estimated cost $280,000.00

** . continue to update equipment

- continue updating of equipment and facilities for special programs
- on-going in-service for staff
- continue implementation of guidelines
- implement the delivery of basic level programs

5. Year V - estimated cost $280,000.00

- complete updating of equipment
- complete equipment of special programs
- on-going in-service of staff
- implement the delivery of basic level programs

** (To meet minimum equipment standards)

General Plan for Years 2 through to 5 to:

1. **Rebuild, replace and upgrade equipment and facilities**
2. Introduce "hi-tech" training equipment
3. **Initiate specialized programs in an area school**

Subject Areas and Programs	YR II	YR III	YR IV	YR V
1. Machine Shop	4	4	3	
. C.N.C. Milling Machines @ 10,000 ea				
. replace 1 shaper per shop with vertical Milling machines @13,000	2	3	3	2
. replace and/or rebuild lathes @ 3,500 each	3	3	3	3
2. Drafting	3	2	2	
. C.A.D. units @ 10,000 each				
3. Electronics	3	3	3	
. programmable controllers @ 1,200. each				
4. Automotive	2	3	3	3
. anaylzers and/or equipment to be determined				
5. Industrial Arts	6	5	5	5
. dust collectors				
. computer assisted programing (per school)	6	5	5	5
6. Special Area Programs				
. Analyzer (Auto @ $30,000.00)		1		
. C.N.C. Lathe (@50,000)				1
. Super C.A.D. (@30,000)			1	
Auto C.A.D.(@10,000 ea)		4	4	

NOTE: Years two through to five will have the specifics defined each year which will be subject to Board approval.

SUMMARY

Y I 1987	Y II 1988	Y III 1989	Y IV 1990	Y V 1991
$ 280,000	$ 280,000	$ 280,000	$ 280,000	$ 280,000
. Introduce hi tech equipment			complete	
. Update to minimum equipment →				
. Relocation of surplus equipment		complete		
. Maintenance millwright →				
. Junior wood shops →		complete		
. Multi-purpose shops pilot -		review		
. In-service of staff →				
. Technical Advisory Committee →				
. review basic level programs and update facilities				
. update middle schools - complete				
. equipment for special programs →				
REVIEW	REVIEW	REVIEW	REVIEW	FIRST 5 YEAR PLAN COMPLETED

This plan over the five year period will meet the recommendations of the T.E.R.C. report, the consolidation report and the objectives as stated by the Ministry of Education. It will also provide opportunities for our young people to meet the challenge of the future.

The technology program will meet the varied needs of our students and community by:

1. providing opportunities for avocational and personal use of technology to carry into a lifestyle

2. providing technological knowledge and skills for post-secondary education

3. providing technology specialization where needed for direct employment and apprenticeship to meet the anticipated demand for skilled labour by our industrial community

NOTE:

1. Each of the phases is subject to review and confirmation at the time of implementation. Board approval will be required annually for each phase of the plan.

2. The detailed budget for each phase of the plan will be submitted annually and will be subject to board approval.

OTHER ISSUES FOR CONSIDERATION

1. Staff:

Projecting four to five years ahead, there will be a shortage of technical teachers in the system as approximately 60% of our present staff may retire. This is an area we should be studying and incorporate into our long range plan.
Some concerns:

- Who will replace the retirees in such large numbers?
- Are the faculties of education preparing for this dramatic demand?
- Should we be hiring staff now with qualifications in technical and academic subjects?

2. Hi-Tech Centre:
A highly industrial area such as Hamilton could support a hi-tech centre.

The possibility of a "high tech" training centre should be explored. The centre could be a collaborative project involving the government, industry and local boards' of education.

Some ideas :

- sharing facilities and cost
- training for students and employees
- updating for industry personnel and teachers
- utilizing of the art equipment
- rotating students through in 25 hour modules as part of their home school program
- operating the school on two shifts, therefore making it available to local business and industry (in the summer term and afternoon shifts)

APPENDIX A

THE BOARD OF EDUCATION FOR THE CITY OF HAMILTON

TECHNICAL EDUCATION REVIEW PROJECT

1986

RECOMMENDATIONS

1. THAT THE STATEMENT OF PURPOSE FOR THE TECHNOLOGICAL STUDIES PROGRAM OF THE BOARD OF EDUCATION FOR THE CITY OF HAMILTON SHALL READ:

FOR ALL STUDENTS, MALE AND FEMALE:

TO DEVELOP USEFUL GENERIC SKILLS (PSYCHO-MOTOR, COGNITIVE, AFFECTIVE) THROUGH EXPERIENTIAL LEARNING. THIS PURPOSE EQUALLY INCLUDES BOTH:

- THE EXPOSURE TO THE WIDE VARIETY OF TECHNICAL SUBJECTS AS ONE MEANS OF ASSISTING THE STUDENT IN ESTABLISHING FUTURE CAREER ASPIRATIONS, AND
- THE DEVELOPMENT OF BASIC AVOCATIONAL SKILLS WHICH WILL PROVIDE BASE FOR FUTURE LEISURE AND HOBBIES AND FUTURE HOME MAINTENANCE COMPETENCIES.

TO DEVELOP AN UNDERSTANDING OF, A POSITIVE ATTITUDE TOWARD, AND A RESPECT FOR:

- WORK
- GOOD SAFETY HABITS
- CO-OPERATION WITH FELLOW WORKERS AND SUPERIORS
- THE PLACE OF TECHNOLOGY IN FOSTERING AESTHETICS
- PRIDE AND SATISFACTION IN THE CREATION OF EXCELLENCE THROUGH QUALITY WORKMANSHIP.

AS WELL, FOR SOME STUDENTS, MALE AND FEMALE:

TO PREPARE FOR FUTURE OCCUPATIONS AND FURTHER EDUCATION BY CONCENTRATING THEIR STUDIES IN A SPECIFIC FIELD OF TECHNOLOGY.

TO PREPARE FOR FUTURE OCCUPATIONS AND FURTHER EDUCATION BY EXPLORING VARIOUS FIELDS OF TECHNOLOGY.

TO PROVIDE EXPERIENCE, IN THE SENIOR DIVISION, IN THE NEW TECHNOLOGIES IN SUCH GENERAL AND/OR ADVANCED LEVEL COURSES AS:

- COMPUTER ASSISTED DESIGN (CAD)
- COMPUTER ASSISTED MANUFACTURING (CAM)
- COMPUTER TECHNOLOGY

Technological Studies, Part A, p. 8

See also Recommendations and 4

cf. Appendices 3 and 4 -- Target Immediate Implementation

"Statement of Purpose" presen to Board for information, 1984 06 20, as part of Interim Report

2. THAT THE NAME "TECHNOLOGICAL STUDIES" BE USED AS THE PROGRAM TITLE IN KEEPING WITH THE DESIGNATION NOW USED BY THE MINISTRY OF EDUCATION, AND THAT THE NAME BE SUBSTITUTED FOR THE WORD "TECHNICAL" IN ALL FUTURE REFERENCES TO THE PROGRAM, POSITIONS OF RESPONSIBILITY, DEPARTMENTS, AND DOCUMENTS.

Technological Studies, Part A, and O.S./I.S.

3. THAT EACH SCHOOL DEVELOP A "STATEMENT OF PURPOSE" FOR THE TECHNOLOGICAL STUDIES PROGRAM IN THAT SCHOOL. THE STATEMENT MUST REFLECT THE SYSTEM STATEMENT IN THE LIGHT OF THE SCHOOL'S PARTICULAR CIRCUMSTANCES AND THE NEEDS OF ITS STUDENTS.

Technological Studies, Part A, pp. 11-20

cf. Appendix 2
Target: 1986-8
(see also Recommendation

Ministry guidelines suggest the following considerations and format.

(a) Responsibility for Plan -- Principal, Vice-Principal, Technical Director

(b) Review Board Plan -- commitment and direction for school

(c) Statement of Purpose:

- Goals and Aims
  - consistent with Ministry, Board, and overall school goals
- Program Delivery
  - Intermediate (Grade 9 and 10)
    - exploring concepts
  - Senior
    - concentration -- multiple credits
  - Modes of Delivery
    - Linkage
    - Co-Operative Education
    - Work Experience
    - Packaging concepts
    - Correspondence, Independent Study
    - Modules
  - Decisions
    - Levels of difficulty
    - Bilevel and/or multigrades
    - Compulsory credit
    - Subjects and programs
    - Timetabling
    - Career information
    - OST endorsements
    - Course calendars
    - Evaluation methods

4. THAT EACH TECHNOLOGICAL STUDIES DEPARTMENT DEVELOP A "STATEMENT OF PURPOSE" FOR: (a) THE DEPARTMENT, AND (b) EACH CLASSROOM/SHOP WITHIN THE CONTEXT OF THE STATEMENTS FOR THE SCHOOL AND THE SYSTEM.

Technological Studies, Part A, pp. 21-24

cf. Appendix 2 - Target: 1986-87 (see also Recommendation 3

Ministry guidelines suggest the following considerations and format.

(a) Responsibility -- Technical Director, Head and Teachers

(b) Review -- Board and School Plans

(c) Statement of Purpose:

- Goals and Aims of specific subject areas
- Program Planning
  - Sequence of courses
  - Courses of Study
    - Ministry-Board curriculum guidelines
  - Language across the curriculum
  - Life skills
  - Adult perspective
  - Sex equity
  - Safety
  - Evaluation

* 5. THAT A TECHNOLOGICAL STUDIES ADVISORY COMMITTEE BE ESTABLISHED TO FACILITATE COMMUNITY INPUT AND PROVIDE A FORUM FOR CONSULTATION ON PROGRAM DIRECTION AND INITIATIVES.

Technological Studies, Part , p.5

(A) COMMITTEE MEMBERSHIP SHALL INCLUDE:

- BOARD REPRESENTATIVES -- A SUPERVISOR, AN OFFICIAL, A TRUSTEE, A HEAD OF TECHNICAL DEPARTMENT
- BUSINESS/INDUSTRY REPRESENTATIVES FROM FIELDS SUCH AS MANUFACTURING, TRANSPORTATION, ELECTRICITY, CONSTRUCTION, SERVICES AND LABOUR
- C.A.A.T. (MOHAWK)

TO PREVENT THE COMMITTEE FROM BECOMING TOO UNWIELDY, MEMBERSHIP SHOULD BE KEPT UNDER A DOZEN PEOPLE.

(B) THE COMMITTEE WOULD BE EMPOWERED TO ESTABLISH SPECIAL COMMITTEES TO DEAL WITH PARTICULAR MATTERS IN SUBJECT FIELDS. SUBJECT ROUNDTABLE REPRESENTATIVES WOULD BE INCLUDED. SUCH COMMITTEES WOULD TERMINATE UPON COMPLETION OF THEIR TASKS.

(C) THE COMMITTEE WOULD BE EXPECTED TO MEET AT LEAST TWICE A YEAR AND WOULD REPORT TO THE SUPERINTENDENT RESPONSIBLE FOR CURRICULUM.

In a time of rapid social, economic, and technological change, close monitoring of, and expeditious response to, change is crucial. Functions of the committee could include:

(i) provision of an additional bridge between business/industry, and education;

(ii) provision of advice and contact in matters relating to trends and change in the world of work and technology;

(iii) review and advice on program structure and direction;

(iv) matters pertaining to:

- career awareness for students
- curricular courses of study (review, etc.)
- staffing priorities and directions
- teacher upgrading and professional development
- facilities, equipment and supplies
- safety policies
- conferences and workshops
- the formal gathering of useful statistical data.

(v) monitoring educational trends and their implications for career-oriented programs and further education;

(vi) recommending on initiatives in public relations to improve the image of Technological Studies.

6. THAT PROVINCIAL INITIATIVES SUCH AS LINKAGE I (APPRENTICESHIP CREDITS BASED ON A PROVINCIAL TRAINING PROFILE STARTING IN SECONDARY SCHOOL) AND LINKAGE II (CURRICULUM BETWEEN SECONDARY SCHOOL AND C.A.A.T.) BE PURSUED TO IMPROVE THE RECOGNITION OF CERTAIN SECONDARY SCHOOL COURSES AND OPPORTUNITIES FOR STUDENTS.

Linkage I has not been widely accepted by employers for a variety of reasons too complex to delineate here. A lack of both a provincial and a federal manpower plan is part of the

problem. The current economic climate is a major block. A completely fragmented industrial sector is another. There is a need for a concerted community initiative possibly through the Industry-Education Council of Hamilton-Wentworth, the Hamilton-Wentworth Community Industrial Training Committee and any subject Advisory Committees of our Board which might be established. Subject roundtable involvement with the process would be vital. (cf. O.S./I.S., Section 5.13; Technological Studies, Part A, pp. 26-27).

Linkage II should be investigated with various departments at Mohawk C.A.A.T. Teacher involvement at this level is also crucial.

7. THAT THE ADMINISTRATION CONTINUE TO MONITOR THE IMPACT OF O.S./I.S. ON THE TECHNOLOGICAL STUDIES PROGRAM AND MAKE REPRESENTATIONS TO THE ONTARIO MINISTRY OF EDUCATION BASED ON FINDINGS.

A number of factors should be considered for monitoring:

- changes in Grade 9 and 10 enrolment (intermediate division)
- changes in senior division enrolment
- trends in concentration packages (senior division)
- trends in course offerings
- surpluses in teaching staff
- subject enrolment changes
- subject teacher imbalances including "crossover" patterns
- trends in "front-end" loading, course level shifts and so forth
- general trends in other non-obligatory subjects.

Other indicators which should be studied probably could be added to the above.

* 8. THAT A CORE CURRICULUM BE DEVELOPED IN EACH SUBJECT AREA ACCORDING TO THE FOLLOWING CRITERIA:

(I) FORMAT WILL BE BASED ON THE CURRICULUM DESIGN MANUAL, A PREPARATION HANDBOOK FOR CURRICULUM DESIGN AND DEVELOPMENT, (HAMILTON BOARD OF EDUCATION, MARCH, 1984).

(II) AFFECTIVE OBJECTIVES, SKILLS OBJECTIVES, AND KNOWLEDGE OBJECTIVES WILL BE CLEARLY DEFINED AND SPECIFIED WITH STUDENT FOCUS.

(III) CORE SUBJECT CONTENT WILL MEET THE REQUIREMENTS OF THE PROVINCIAL CURRICULUM DOCUMENTS TECHNOLOGICAL STUDIES, PART B, AND/OR SENIOR DIVISION TECHNOLOGY DOCUMENTS WHERE APPROPRIATE.

(IV) EACH CURRICULUM WILL INCORPORATE A BASIC LIST OF THE EQUIPMENT REQUIRED TO UNDERTAKE THE CURRICULUM AND TO FACILITATE INCORPORATION WITHIN A LONG-RANGE OVERALL EQUIPMENT PLAN.

INITIAL PRIORITY SHOULD FOCUS ON: (1) MANUFACTURING TECHNOLOGY AND (2) DRAFTING, FOLLOWED BY ELECTRICITY, ELECTRONICS, AUTO MECHANICS, AND WOODWORKING/BUILDING CONSTRUCTION. OTHER SECONDARY COMPOSITE AND SECONDARY VOCATIONAL SUBJECTS SHOULD BE PRIORITIZED AND DEVELOPED.

Core curricula exist in Drafting, Machine Shop, Electricity and Electronics, Vocational Welding, "Practical Technology for Living" and Industrial Arts (Grades 6-8). In-depth curricula exist in Engineering Graphics (O.A.C.), and Computer Technology (General Level, Grades 11-12). Existing core documents will have to be revised to meet the new provincial requirements.

The provincial curricula as expressed in the Part B documents are pending while the overall philosophy is expressed in Part A which is already published.

Writing teams should be designated within the various subject roundtables to accomplish the task and provided in the process with in-service training in the format required.

The comment on "student focus" is to emphasize that such curricula will present the objectives from the student perspective ("The student will know ...", "The student will do ...", and so forth). This is to preclude simply a teacher-centred point-form topical checklist.

* 9. THAT THE DRAFTING PROGRAM BE RESTRUCTURED IN THE SENIOR DIVISION TO PROVIDE A BROAD OVERVIEW OF ENGINEERING GRAPHICS BASED ON THE FOLLOWING CRITERIA:

Target: Curriculum Revie and Modificatior 1986-87

(A) STUDENTS WITH PRIOR DRAFTING BACKGROUND WHO WISH ONE OR TWO CREDITS EACH YEAR AND WISH TO PURSUE FURTHER COURSES MAY SELECT ONE CREDIT EACH YEAR IN MECHANICAL DRAFTING AND ONE CREDIT EACH YEAR IN ARCHITECTURAL DRAFTING IF THEY WISH TO CONCENTRATE IN DRAFTING. HOWEVER, SINGLE CREDITS MAY BE SELECTED BY A STUDENT IF DESIRED. COURSES SHOULD BE REWRITTEN TO REFLECT THIS REALIGNMENT.

It is possible that not all schools will offer a double credit since not all schools have a wood and building construction facility which can be supportive to an architectural program.

(B) GENERAL DRAFTING COURSES SHOULD BE DEVELOPED AT TWO LEVELS OF DIFFICULTY IN THE SENIOR DIVISION:

Target: Curriculum Desig 1986-87

(I) A SINGLE CREDIT COURSE AT THE GENERAL LEVEL (GRADE 11) FOR THOSE WHO WISH TO OBTAIN SOME BACKGROUND BUT LACK PRIOR EXPERIENCE. IT WILL NOT BE OPEN TO PEOPLE CONCENTRATING IN DRAFTING. EXPERIENCE IN DIVERSE AREAS SUCH AS ARCHITECTURAL AND MECHANICAL DRAFTING, BLUEPRINT READING AND SKETCHING WILL BE INCLUDED. UPON COMPLETION OF THIS COURSE, CAPABLE STUDENTS MIGHT ENTER GRADE 12 OF THE CONCENTRATION COURSE. AN APPROPRIATE COURSE SHOULD BE DEVELOPED.

Many students do not develop an awareness of directions they may wish to pursue until the later grades. This will permit students to pick up some drafting background in the senior division without having taken a course earlier in the packed Grade 9/10 years.

Target: Curriculum Des 1986-87, Implementation Grade 11, 1987 Grade 12, 1988

(II) A SINGLE CREDIT COURSE AT THE ADVANCED LEVEL IN EACH OF GRADES 11 AND 12 FOR STUDENTS PLANNING TO PROCEED TO FURTHER EDUCATION (TECHNOLOGIES, PHYSICAL SCIENCES, ENGINEERING ...) UPON COMPLETION OF THE GRADE 11 COURSE A STUDENT MAY PROCEED TO THE GRADE 12 COURSE OR THE GRADE 12 GENERAL LEVEL COURSE (WITH PERMISSION). APPROPRIATE COURSES SHOULD BE PREPARED.

Students entering university engineering or a C.A.A.T. program without a prior drafting background frequently find themselves "tossed into" engineering graphics courses where fundamentals receive cursory attention in favour of more advanced work. These courses are intended to bridge this problem and provide skills and knowledge relative to a broad range of applications in tertiary courses.

(C) SUBJECT TO MINISTRY OF EDUCATION REAPPROVAL, THE ONTARIO ACADEMIC CREDIT ENGINEERING GRAPHICS SHOULD CONTINUE TO BE OFFERED IN THOSE SCHOOLS WHERE SUFFICIENT CANDIDATES ARE AVAILABLE.

Engineering Graphics (TDM5AX (Hamilton Board Education Curriculum, 1971

This successful course builds on some fundamentals in drafting to move quickly to work in descriptive geometry and engineering applications. For this reason, there are no prerequisites.

SUMMARY OF PROPOSED RESTRUCTURING

GENERAL DRAFTING:

General Level - for those who wish to obtain some background but lack prior experience. Not open to students concentrating in drafting. Experience in diverse areas such as architectural and mechanical drafting, and including blueprint reading and sketching.

MECHANICAL / ARCHITECTURAL

For students who wish one or two credits each year and have prior drafting background.

TDM 3G1 and/or TDA 3G1
Prerequisite: at least one intermediate credit

O.A.C. ENGINEERING GRAPHICS TDM 5AX

Pre-requisite: none

TDR 3G PERMISSION

Prerequisite: none

Advanced Level - for students planning to proceed to further education (technologies, physical sciences, engineering ...)

TDR 3A PERMISSION

Prerequisite: none

TDR 4A
Prerequisite: TDR 3A

TDM 4G1
Prerequisite: TDM 3G1
and/or
TDA 4G1
Prerequisite: TDA 3G1

* 10. THAT THE MACHINE SHOP PROGRAM BE RESTRUCTURED AS A MORE BROADLY BASED MANUFACTURING TECHNOLOGY PROGRAM IN THE SENIOR DIVISION BASED ON THE FOLLOWING CRITERIA:

(A) THE PROGRAM WILL BE RENAMED "MANUFACTURING TECHNOLOGY" (TMY).

Target: Immediately

(B) THE COURSES SHOULD BE DIRECTED TOWARD A BROADER UNDERSTANDING OF THE MANUFACTURING PROCESS INCLUDING AN AWARENESS OF THE NEW TECHNOLOGIES AND THEIR IMPLICATIONS. THEY SHOULD BE EXPERIENTIAL AND PRACTICAL. THEORY SHOULD BE INCORPORATED AS NEEDED. EVALUATION SHOULD BE CHANGED TO REFLECT THE NEW EMPHASIS. ALTHOUGH MACHINING PROCESSES WOULD BE THE FOCUS OF THE COURSE, MODULES DEALING WITH OTHER MANUFACTURING PROCESSES (SUCH AS WELDING AND FABRICATING, COMPUTERIZED PROCESSES, MATERIALS, HYDRAULICS AND PNEUMATICS, AND SO ON) WOULD BE DEVELOPED. A MAJOR THRUST MUST BE APPLICATIONS TO A WIDE VARIETY OF CAREERS FROM ENGINEER TO SALESMAN.

(C) EXISTING EQUIPMENT SHOULD BE REVIEWED TO DETERMINE ITS APPROPRIATENESS. EQUIPMENT SHOULD BE TRANSFERRED OR SOLD AS REQUIRED. SIMULATION EQUIPMENT TO INTRODUCE THE NEW TECHNOLOGIES SHOULD BE STUDIED AND PLANNED PURCHASES BE MADE.

cf. Recommendation

(D) A SINGLE CREDIT GRADE 11 COURSE SHOULD BE DEVELOPED FOR STUDENTS WITHOUT PRIOR EXPERIENCE. IT WOULD BE OPEN TO GRADE 12 STUDENTS, AS WELL. CONTINUATION IN A PARALLEL GRADE 12 COURSE WOULD BE POSSIBLE WITH PERMISSION.

Target: Curriculum Desi 1986-87

(E) THE OPPORTUNITY FOR STUDENTS TO CONTINUE INTERMEDIATE DIVISION EXPERIENCES IN A SINGLE CREDIT COURSE IN EACH OF GRADES 11 AND 12 SHOULD BE AVAILABLE.

Target: Immediate Implementation

(F) FOR SOME STUDENTS, THE OPPORTUNITY FOR DOUBLE CREDIT CONCENTRATION IN THE SUBJECT WOULD BE PROVIDED IN DESIGNATED SCHOOLS.

(G) A MAJOR INITIATIVE SHOULD BE UNDERTAKEN TO DEVELOP CURRICULUM MODULES APPROPRIATE TO THE CRITERIA EXPRESSED IN ITEM (B). THIS TASK SHOULD BE GIVEN TO THE "CAM (COMPUTER AIDED MANUFACTURING) GROUP" WHICH HAS ALREADY CARRIED OUT SUCH DEVELOPMENT WORK FOR OVER ONE YEAR. THE "CAM GROUP" SHOULD ALSO BE EMPOWERED TO CONDUCT IN-SERVICE AND UPGRADING WITH OUR EXISTING STAFF OF MACHINE SHOP TEACHERS. TO THIS END, UPGRADING FUNDS SHOULD BE PROVIDED TO PERMIT SUBSTITUTE TEACHERS TO BE OBTAINED.

Target: Initiated 1984 Completed 1986

SUMMARY OF PROPOSED RESTRUCTURING

For students who want a single credit but lack prior experience.	For students with prior experience who want a single credit each year.	For students who want subject concentration
Integrated manufactufacturing courses		Increased depth in machining processes
TMY 3G (no prerequisite)	TMY 3G1 (intermediate division credit prerequisite)	TMY 3G2 (TMY 3G1 prerequisite)
WITH PERMISSION	TMY 4G1 (TMY 3G1 prerequisite)	TMY 4G2 (TMY 3G2 & 4G1 prerequisites)
May be offered at all schools	Offered at all schools	Offered only at designated schools

(H) FOR THE TIME BEING, INDIVIDUAL SCHOOLS SHOULD BE PERMITTED TO OFFER SINGLE CREDIT COURSES IN MATERIALS AND PROCESSES (TIX) IN THE SENIOR DIVISION. AT PRESENT, THREE SCHOOLS (GLENDALE, SHERWOOD AND SIR ALLAN MACNAB) OFFER DISTINCTIVE COURSES. HALF CREDIT COURSES SHOULD NOT BE OFFERED.

- THE LONG-RANGE GOAL IS TO INTEGRATE THESE MODULES WITHIN THE MANUFACTURING CURRICULUM.

- THIS IS NOT TO SUGGEST THAT A MATERIALS AND PROCESSES COURSE SHOULD NOT EXIST IN THE 3G1/2 CATEGORIES AS AN OPTION. THERE COULD BE A STRONG APPEAL AT THE ADVANCED LEVEL (3A1/2), POSSIBLY AS OPPOSED TO THE GENERAL LEVEL.

(I) "METALLURGY" AND "STRENGTHS OF MATERIALS" AS DISCRETE COURSES EXIST IN ONLY A FEW SCHOOLS. THESE SHOULD BE ABSORBED WITHIN EXISTING MANUFACTURING AND/OR DRAFTING COURSES AS SOON AS POSSIBLE. IN-DEPTH "STRENGTHS OF MATERIALS" ARE PROBABLY INAPPROPRIATE TO THE MATHEMATICAL REALITIES OF THE GENERAL LEVEL.

Future projections in manufacturing suggested that a major reorientation of the Machine Shop programs was in order. In an attempt at redirecton, a Materials and Processes course was established in 1971 in one school. In the following years, two

more schools undertook to introduce courses. The major problem has been to reorient the perceptions and inclinations of our existing staff to changes in technology and educational processes. These are two key elements in reorienting the program: (1) upgrading of teachers in the new concepts, and (2) providing the basic equipment necessary for restructuring.

11. THAT COMPUTER TECHNOLOGY COURSES BE OFFERED IN THE SENIOR DIVISION IN EACH OF GRADES 11 AND 12 AT THE GENERAL LEVEL OF DIFFICULTY. SUCH COURSES SHOULD BE OFFERED ONLY IN SCHOOLS WHERE THEY WOULD BE VIABLE.

cf. Computer Studies, Intermediate an Senior Division (Ministry of Education, 1983

Existing electronics courses in the senior division have been changing during the last decade to increasingly incorporate elements of the rapidly evolving technology. Some of the elements which have been incorporated are integrated circuitry, digital electronics, and microprocessor applications in technology. Much of the equipment required for such courses is already to be found in most electronics shops. Logic trainers which are the heart of such courses fall within the "supply item" category. The resource base is in place in most schools. Building this base is mainly a matter of reallocating the supply of funds over a period of several years.

Hamilton Curriculum developed 1984- Grade 11 implemented 1985-86; Grade 12 target 1986-87

While the computer technology courses will probably attract some students working at the general level but with genuine interests and capabilities oriented toward computer technology, these courses would be primarily aimed at students envisioning tertiary education and training.

These courses would be taught by electronics teachers. New certification procedures for teachers in the various computer disciplines are currently under development by the Ministry. Two computer trainers for the upgrading of teachers are currently in use in our system.

In due course, decisions will have to be made relating to a Grade 12 credit at the advanced level.

12. THAT A MODULAR PRACTICAL TECHNOLOGY "LIFE SKILLS" COURSE AT THE GENERAL LEVEL, PROBABLY GRADE 10, BE DEVELOPED AND MADE AVAILABLE FOR ALL SCHOOLS TO OFFER IF IT MEETS THEIR NEEDS. THE AIM OF THE COURSE IS TO PROVIDE TECHNICAL SKILLS AND KNOWLEDGE WHICH READILY APPLY TO THE RIGOURS OF EVERYDAY LIFE TO STUDENTS WHO MIGHT NOT OTHERWISE SELECT A TECHNICAL COURSE. THE CO-ED NATURE IS TO BE EMPHASIZED. IT WOULD BE OPEN TO SENIOR DIVISION STUDENTS WHO WANTED TO TAKE IT. MODULES WOULD INCLUDE:

Hamilton Curriculum Practical Technology for Living develope 1984-85 and implemented 1985-86

- PLANNING
- AUTO OWNERSHIP AND SERVICING
- HOME ELECTRICITY
- POWER MECHANICS AND SMALL ENGINES
- WOODWORKING FUNDAMENTALS AND RELATED REPAIRS
- HOME PLUMBING AND REPAIRS
- WORKING WITH METALS
- OPERATING PRINCIPLES OF COMPUTERS.

A PARTICIPATING SCHOOL WOULD SELECT THE MODULES IT WOULD OFFER SUBJECT TO ITS PARTICULAR NEEDS. THE TITLE OF THE COURSE WOULD BE "PRACTICAL TECHNOLOGY FOR LIVING" (TIE 2G).

13. THAT SERIOUS CONSIDERATION BE GIVEN TO WAYS IN WHICH PROGRAMS AND FACILITIES PECULIAR TO EITHER COMPOSITE OR VOCATIONAL SCHOOLS COULD BE UTILIZED TO THE ADVANTAGE OF STUDENTS IN BOTH KINDS OF SCHOOLS. INITIATIVES TO DO THIS BETWEEN SCHOOLS SHOULD BE ENCOURAGED.

There are certain programs and facilities which are peculiar to either a composite or a vocational school. For example, experiences in machine shop or electricity could well be beneficial to vocational students, while such areas as auto body, graphic arts and hairdressing offer ideal opportunities for composite students. Some crossover experiences have occurred in the past. Much more needs to be done to enrich students' experiences by fully utilizing the resources of our system.

* 14. THAT THE NEED TO INCORPORATE A WOODWORKING FACILITY IN EACH COMPOSITE SCHOOL BE INVESTIGATED.

Woodshop is a major facility that appeals to all age groups of the community. It provides lifetime skills for girls and boys for personal growth as well as vocations, and for adults of all ages.

15. THAT INDIVIDUAL SCHOOLS BE ENCOURAGED TO PLAN AND IMPLEMENT INNOVATIVE PROGRAMS DESIGNED TO MEET THE NEEDS OF THE SCHOOL COMMUNITY IN LIGHT OF CHANGING SOCIETAL NEEDS AND TECHNOLOGICAL INNOVATION.

During a period of declining enrolment and difficulties in maintaining traditional programs, school staffs need the encouragement and the opportunity to package courses in novel ways and pilot them in the search for new approaches to program design.

* 16. THAT A REVIEW OF MAJOR EQUIPMENT BE CONDUCTED AND A LONG-RANGE EQUIPMENT PLAN BE ESTABLISHED. THE REVIEW SHOULD INCORPORATE SUCH ELEMENTS AS LOCATION, DESCRIPTION, AGE, CONDITION, STATUS (IE., OBSOLESCENCE, AVAILABILITY ...). THE LONG-RANGE EQUIPMENT PLAN SHOULD COVER A PERIOD OF APPROXIMATELY FIVE YEARS AND SHOULD INCLUDE A SCHEDULE OF REPLACEMENT, REPAIR, OR DISPOSAL, AS DETERMINED BY CURRICULUM NEEDS. IT SHOULD PROVIDE A BASIS FOR EQUIPMENT UPGRADING AND MAINTENANCE, AND WOULD OPERATE IN CONJUNCTION WITH ANY PLAN TO INTRODUCE EQUIPMENT REFLECTING THE RECENT ADVANCES IN TECHNOLOGY.

cf. Appendix :

Technological Studies, Part . p.10

For immediate implementation

cf. Recommendation

In a time of financial constraint, rising prices, and rapid technological and curricular changes, it is more important than ever to marshal existing resources carefully, while reflecting the needs of changing curricula. To do this, long-range planning is vital.

The task is monumental since the scope of our facilities and equipment must be compared with that of a medium-sized industry of great diversity. A major financial commitment by the Board will be necessary to support such a plan.

* 17. THAT A PRIORITY PROGRAM BE ESTABLISHED COMMENCING SEPTEMBER, 1986, TO PLACE IN ALL SCHOOLS ADVANCED TECHNOLOGY EQUIPMENT IN AT LEAST ONE SHOP TO SUPPORT PROGRAM UPGRADING AND REALIGNMENT. SOME EXAMPLES ARE:

cf. Recommendation Recommendation

- COMPUTERIZED MILLING MACHINE (BENCH MODEL)
- COMPUTERIZED LATHE (BENCH MODEL)
- HYDRAULICS TRAINER
- PNEUMATICS TRAINER
- COMPUTER AIDED DESIGN UNIT (CAD)
- PROGRAMMABLE CONTROLLER
- ENGINE AND MOTOR EXHAUST GAS ANALYSER
- ELECTRONICALLY CONTROLLED VARIETY SAW

EACH SUBJECT ROUNDTABLE SHOULD BE CONSULTED TO DETERMINE AREAS OF ADVANCES AND NEED, AND RECOMMENDED PLACEMENT. EACH SUBJECT AREA WOULD REQUIRE CAREFUL ANALYSIS IN LIGHT OF THE CURRICULUM TO DETERMINE SUCH NEEDS.

Two examples are offered to illustrate the nature of this aspect of a Long-Range Equipment Plan. They are not intended to be exclusive. Each subject area would require careful analysis in the light of the curriculum to determine such needs.

The Supervisor's CAM (Computer Aided Manufacturing) Group made a presentation to the Technical Education Review Committee to revamp the machine shop program along the lines of manufacturing technology. This involves program development in automated process including computerized numerically controlled machines and hydraulic/pneumatic control systems. The basis for the programming of such units is an understanding of basic machining processes. Fortunately, small trainers of various kinds are now on the market at a fraction of the cost of industrial units.

Modern design drafting processes involve Computer Aided Design hardware. Such hardware range from sophisticated high cost units to those based on the more powerful personal computers. A reasonably priced package based on the IBM Personal Computer includes a digitizer tablet, a "mouse", a plotter, and a software program.

* 18. THAT AN EQUIPMENT MAINTENANCE TEAM BE ESTABLISHED WITH THE GOAL OF PROVIDING ONGOING MAINTENANCE AND UPGRADING OF EQUIPMENT WITHIN THE SYSTEM. SUCH A TEAM WOULD INCLUDE AN INDUSTRIAL MECHANIC AND AN INDUSTRIAL ELECTRICIAN. A REPORT SHOULD BE PREPARED INCORPORATING COST ESTIMATES AND THE EXPERIENCE OF OTHER BOARDS WHICH HAVE SUCH PROGRAMS IN OPERATION.

The first Board to undertake such a program was North York. Others have followed including Scarborough and Waterloo. Such Boards have found having their own maintenance staff to provide for ongoing maintenance is not only cost effective but maintains equipment at a uniformly high level of quality across their systems. It is entirely possible that the maintenance team would be able to assist in the accomplishment of Recommendation 12.

* 19. THAT A TECHNOLOGICAL STUDIES TEACHER DEVELOPMENT PROGRAM BE ESTABLISHED IN CONJUNCTION WITH THE STAFF DEVELOPMENT DEPARTMENT TO PROVIDE VARIOUS AVENUES OF SUBJECT SPECIFIC GROWTH AND UPGRADING. SINCE THE PARTICULAR NEEDS ARE AS DIVERSE AS THE NATURES OF THE SUBJECTS INVOLVED, THE PROGRAM WOULD HAVE TO BE FLEXIBLE IN TERMS OF THE AVENUES EMPLOYED. THESE COULD INCLUDE:

cf. Appendix 1

(A) INDUSTRY/BUSINESS ASSIGNMENTS (RANGING FROM ONE DAY TO TWO WEEKS) WITH SPECIFIC LEARNING OBJECTIVES DEFINED.

(B) CO-OPERATIVE VENTURES INVOLVING THE PARTICIPATION OF SKILLED PERSONNEL FROM BUSINESS AND INDUSTRY IN THE SCHOOL SETTING.

(C) UPGRADING PROGRAMS AND COURSES THROUGH SUCH AGENCIES AND GROUPS AS:

- INDUSTRIAL TRAINING ORGANIZATIONS
- COLLEGES OF APPLIED ARTS AND TECHNOLOGY
- BUSINESS AND INDUSTRY (IE. GENERAL MOTORS COURSES)
- OUR OWN RESOURCES (IE. COMPUTER AIDED MANUFACTURING GROUP)
- SUMMER FELLOWSHIPS (BASED ON SUPPLY RATES).

FUNDING SHOULD PROVIDE FOR FEES, TRANSPORTATION, AND QUALIFIED PERMANENT STAFF TEACHERS TO ALLOW FOR IMPLEMENTATION OF THE PROGRAM.

Rapidly changing technology has imposed increasing demands for technical teachers to continuously update themselves in their specific disciplines. These dichotomies, coupled with a staff whose average age is beyond the average for the profession, suggest that subject specific upgrading is in order.

As well as obtaining Additional Basic Qualifications in a variety of technical subjects, technical teachers are under strong pressure to obtain General Studies Qualifications in academic subjects. The demands are high and unceasing.

The draft provincial curriculum (Technical Studies, Part A, pp. 12-13) refers to the impact of technological changes specifically in the areas of new or high technology. It states, "... that teachers of drafting and machine shop must become knowledgeable about computer assisted design (CAD) and computer assisted manufacturing (CAM), teachers of graphic arts with computer graphics equipment, electrical and electronics teachers be prepared to teach various aspects of digital circuits and microelectronics, and automotive studies teachers be up-to-date with latest diagnostic test machines and equipment. Other technological studies teachers will be similarly affected as the use of computers increases in each field. As well, teachers will be required to become knowledgeable about the use of microcomputers as a teaching aid."

The provincial curriculum document also addresses "Staff Development" in terms of two major challenges: (i) "the need to remain up-to-date and competent in their subject areas", and (ii) "the need to become aware of teaching strategies which will assist exceptional students." In the former instance, new or high technology is emphasized. The teaching of a technical subject area outside the area of specialization is also referred to. The guideline states:

> "Programs for staff development could include teacher-peer training; attendance in courses, conferences, and seminars offered by various institutions and private corporations; the use of professional development days for curriculum and implementation; the use of internal and external resources; and self-directed learning."

The nature of upgrading is as variable as the number of technical disciplines. Many approaches are necessary. A co-operative effort on the part of both the Board and its technical staff is necessary.

The ten recommendations of the Report of the Teacher Work Experience Committee (Hamilton Board of Education, 1980-81), should be reviewed.

cf. Appendix 1

20. THAT THE BOARD INITIATE A SYSTEM OF EARLY RETIREMENT INCENTIVES TO RELIEVE THE STAFFING PROBLEMS CREATED IN TECHNOLOGICAL STUDIES AND OTHER AREAS.

cf. Appendix 17

In the last few years, diverse forces (such as declining enrolment, O.S./I.S., employment and economic changes, technological change ...), have come together to have a profound impact on enrolments in Technological Studies programs across the province.

In Hamilton, we have staff surpluses in drafting and machine shop and shortages in electrical, electronics, and construction areas.

The average age of the Technological Studies teachers in the composite schools in 1985 is 52. There have been few opportunities in recent years to add younger teachers with their fresh perspectives and recent experiences to the staff. Action is needed to encourage the "early" retirement of significant numbers of Technological Studies teachers, hopefully reducing the numbers in surplus areas and permitting hiring in areas of shortage. Restoring a balanced staff is a major challenge which is central to a reorganized curriculum in Technological Studies.

* 21. THAT THERE BE INCREASED PUBLICITY FOR TECHNOLOGICAL STUDIES COURSES IN HAMILTON.

It is apparent that a concerted effort must be made at all levels in the Hamilton system to publicize the opportunities provided to students through Technological Studies courses. There is no one way to achieve this, but fruitful results would be produced by a variety of initiatives. The collective and individual efforts of everyone committed to technological education is vital. The following list presents a few of these initiatives, some of which have already been undertaken in various schools.

- Concerted teacher contacts with Grade 7 and 8 students through Industrial Art teachers
- Pamphlets, fliers, posters
- Mall exhibits
- Slide/cassette sets
- Option discussions with students
- Technology Fair (possibly in co-operation with Mohawk C.A.A.T.)
- Subject specific, city-wide contests (in drafting contests)
- News releases to local newspapers to trumpet particular achievements and to our Board Information Officer ... photographs expand interest particularly when students are involved.

Brainstorming activities would add extensively to the above.

22A. THAT CO-OPERATIVE EDUCATION PROGRAMS CONTINUE TO BE EXPANDED WITHIN OUR SYSTEM. ...

cf. Technologi Studies, Part A p. 25, and O.S./I.S., pp. 25 ff

With specific reference to Co-Operative Education, a number of statements in O.S./I.S. stand out:

(a) "The content of both the in-school and out-of-school components should be developed by teachers who are knowledgeable in the subject areas."

(b) "The out-of-school component of the course must be outlined ..."

(c) "These are legitimate demands on the teacher's time and need to be accommodated in his/her timetable."

(d) "... its out-of-school learning should be closely related to the in-school component."

(e) "All co-operative education courses require that a teacher, knowledgeable in the area under study be involved in the planning and monitoring of the out-of-school component."

22B. THAT INNOVATIVE PRACTICES IN WORK EXPERIENCE BE ENCOURAGED AND PRESENTLY OPERATING PROGRAMS BE EXPANDED.

* 23. THAT THE INTENT OF THE INTERIM REPORT OF THE ADULT DAY SCHOOL COMMITTEE (MARCH 19, 1984) BE ACTED UPON THROUGH A FORMAL PROCESS OF COURSE OFFERINGS AND WIDE-SPREAD ADVERTISING. TECHNICAL COURSES OF A DIVERSE NATURE WOULD BE PART OF THIS PROCESS. COURSE OFFERINGS WILL VARY ACCORDING TO THE NATURE OF EACH SCHOOL AND ITS COMMUNITY. THIS COMMITTEE RECOGNIZES THAT THE SECONDARY SCHOOL SERVES THE ENTIRE ADULT COMMUNITY AND AS SUCH, HAS A RESPONSIBILITY TO OFFER COURSES THAT MEET THE NEEDS OF OLDER ADULTS AND SENIOR CITIZENS.

cf. Appendix 1

* 24. THAT STUDENTS WHO ARE CONSIDERING "DROPPING OUT" OF SCHOOL BE PERMITTED AND ENCOURAGED TO TAKE AS MANY "VOCATIONALLY ORIENTED" SUBJECTS (IE. TECHNOLOGICAL STUDIES, BUSINESS EDUCATION ...) AS THEY WISH NOT WITHSTANDING DIPLOMA REQUIREMENTS. SUCH STUDENTS COULD RECEIVE A "CERTIFICATE OF EDUCATION" (IF APPROPRIATE) AND/OR A "SCHOOL-LEAVING CERTIFICATE" LISTING ALL THE CREDITS ACHIEVED, AND LISTING ADDITIONAL COURSES REQUIRED TO OBTAIN AN O.S.S.D. IN THE FUTURE, SHOULD THEY SO WISH.

Counsellors and teachers are often aware of potential "drop outs". This proposal is aimed at encouraging such students to obtain some job skills prior to leaving. As well, such a venture might well relieve the academic pressures from some students sufficiently to keep them in school for a longer period of time, possibly with a long-term benefit of allowing them time to reorganize their lives and even complete diploma requirements.

The "Certificate of Education" for early school leavers as defined by O.S./I.S. "requires" six compulsory subjects and eight electives, but this is qualified for "exceptional students". However, many students might not be eligible. For this reason, a special certificate which also lists the courses still required to achieve a diploma might well encourage such students to start to pick up such courses in evening school classes. This document would be devised by, and peculiar to, our system.

25. THAT, UPON GRADUATION, AN ENDORSEMENT IN TECHNOLOGICAL STUDIES BE GRANTED TO PERSONS WHO CONFORM TO THE O.S./I.S. DEFINED "SCHOOL-RELATED PACKAGE: TECHNOLOGICAL STUDIES" OF 8 CREDITS (OR MORE) TAKEN BETWEEN GRADES 9 AND 12 INCLUSIVE, AND ...

O.S./I.S., pp. 23-24

Target: Immediate Implementation

IN ADDITION, STUDENTS WHO HAVE A CONCENTRATION OF TWO TECHNOLOGICAL STUDIES CREDITS IN A PARTICULAR SUBJECT IN EACH OF GRADES 11 AND 12 (WITHIN THE 8 CREDITS) MAY RECEIVE A SPECIFIC ENDORSEMENT IN THAT SUBJECT.

Support for the concept of a school-related package is defined in the Ministry of Education document, Ontario Schools, Intermediate and Senior, section 5.9, pp. 23-24.

The specific endorsement reflects our current practice of endorsement for those students who take a concentration in a particular subject area but excludes the currently defined academic requirements.

* 26. THAT THE FEASIBILITY OF ESTABLISHING A STUDENT ASSESSMENT CENTRE BE INVESTIGATED FOR IMPLEMENTATION BY SEPTEMBER, 1987. THE PURPOSE OF SUCH A CENTRE WOULD BE TO ASSIST STUDENTS IN ASSESSING THEIR SKILLS, APTITUDES AND INTERESTS IN THEIR SEARCH FOR FUTURE DIRECTIONS. THE ORGANIZATION OF THE CENTRE SHOULD BE SUCH THAT PRACTICAL, COMPREHENSIVE TECHNIQUES WOULD BE EMPLOYED IN A PLANNED, ORDERLY MANNER BY A STAFF DEVOTED TO THE MANDATE OF THE CENTRE.

Even in our age of high unemployment among young people, it remains a vital belief of our society that every person should earn his/her own living. Some futurists suggest that different patterns of employment and unemployment will have to evolve. In the meantime, the maxim of the "work ethic" must continue to hold and is still a powerful force in our social structure.

Many believe that the high school years should be a time to gain both a solid foundation in communication, computational, and liberal studies and a broad range of experiences which permit students to assess their interests and aptitudes in diverse fields. It should be a time of sensing broad vocational directions (ranging from labourer to professional) in as realistic a manner as possible. Statistics suggest that for too many students these years are a time of confusion, disillusionment, and even despair, often leading to failures.

Many students simply abandon the school setting, the scene of their distress. Initiatives to assist them toward developing their self-awareness are of crucial importance.

Of the 30% or so of students who go to further education or training, there are undoubtedly many who have done so because when faced with the reality of having completed secondary school, continuing on to a tertiary level institution is the last bastion in search for a possible career direction. Blind wanderings and blunders at these levels and in the late teens and early twenties are expensive, indeed, to all society.

The greatest tragedy of all in social terms must be the significant number of students who do not complete secondary education much less achieve a range of marketable skills and knowledge which permit them to even sniff at a job opportunity. A job at least provides a base for further planning and preparation for the next step.

A Student Assessment Centre has considerable merit indeed. Various models currently exist and should be examined.

27. THAT THE INVOLVEMENT OF GIRLS IN SECONDARY SCHOOL TECHNOLOGICAL STUDIES COURSES BE STUDIED BY A SMALL COMMITTEE, AND A REPORT WITH CONCLUSIONS BE COMPILED FOR SUBMISSION TO ACADEMIC COUNCIL BY SEPTEMBER, 1987.

The decline in participation of girls in Technological Studies courses in composite school over the last several years has been significantly greater than the general enrolment decline in the system. How this relates to internal equal opportunities trends is not clear. Again, the effectiveness of fully co-ed classes as opposed to classes designed specifically for girls requires consideration. The realities of background and resulting attitudes of girls compared with boys must be taken into consideration. Another element is the offering of both co-ed and all-girl classes taking student needs into consideration.

28. THAT EVERY SENIOR STUDENT TAKE AT LEAST ONE CREDIT IN TECHNOLOGICAL STUDIES.

APPENDIX B

Ontario Ministry of Education	Board of Education for the City of Hamilton
GOALS	
The goals of education consist of helping each student develop:	The Board of Education endeavours to provide a comprehensive programme of education based on the attainment of the following goals:
- a responsiveness to the dynamic process of learning.	- developing intellectual curiosity, awareness, sensitivity, perserverance, and a desire for excellence.
- resourcefulness, adaptability, and creativity in learning and living.	- assisting in intellectual, social, emotional, physical, moral and cultural development.
- the basic knowledge and skills needed to comprehend and express ideas through words, numbers, and other sysmbols.	- encouraging growth in the skills of communication and computation, fundamental to basic and continuing education.
- physical fitness and good health.	
- satisfaction from participating in and from sharing the participation of others in various forms of artistic expression.	- engendering an appreciation of art, music and literature, and of the place of mathematics and science in our society.
- a feeling of self-worth.	- helping to develop a sense of self-worth.
- an understanding of the role of the individual within the family and the role of the family within the society.	- providing opportunities to gain insight into the functioning of Canadian society and the individual's role within it.
- skills that contribute to self-reliance in solving practical problems in everyday life.	- developing skills in the processes of inquiry, analysis, synthesis and evaluation.
- acceptance of personal responsibility in society at the local, national, and international levels.	- helping to develop self-respect, respect for others, and respect for the law.
- esteem for the customs, cultures, and beliefs of a wide variety of societal groups.	- helping to gain an understanding of other social and cultural groups.
- skills and attitudes that will lead to satisfaction and productivity in the world of work.	- assisting in the development of skills and abilities necessary to a meaningful, satisfying and productive life.
- respect for the environment and a commitment to the wise use of resources.	- fostering an appreciation of cultural heritage, and of the environment in which we live.
- values related to personal, ethical or religious beliefs and to the common welfare of society.	- encouraging an appreciation of ethical values changes.
Issues and Directions -- pp. 4-7.	Blueprint for the Eighties -- pp. 103-104.

APPENDIX C
Technological Studies
Year I of the V Year Plan

This plan is phase I of a 5 year plan to initiate the renewal of Technical Education in Hamilton. Phase I is divided into four parts with each part focusing on specific needs in special areas.

Year I is based on the following:

1. The immediate needs for students as expressed by Principals and the Heads of Technological Studies Departments.

2. The recommendations of subject committees vis-a-vis equipment requirements.

3. The recommendations of the T.E.R.C. report.

PROPOSAL:

Equipment and Facilities:

Due to funding restrictions for education by the Province and the consequent budget restraints, the updating of Technological Studies equipment and facilities has been minimal. Over the past years wear and tear on equipment have taken their toll to the extent that program delivery has been hampered. The combination of the need for replacement of aging equipment and keeping pace with new technologies makes it imperative to start a replacement plan.

This plan is based on the following recommendations from T.E.R.C.:

(#10.) That the Machine Shop program be restructured as a more broadly based manufacturing technology program..

(#14.) That the need to incorporate a Woodworking facility in each composite school be investigated.

(#15.) That individual schools be encouraged to plan and implement innovative programs designed to meet the needs of the community in light of changing societal needs and technological innovation.

(#17.) That a priority program be established commencing September 1986, to place in all schools advanced technology equipment...

(#18.) That an equipment maintenance team be established...

(#19.) That a Technological Studies Teacher Development program be established...

(#21.) That there be increased publicity for Technological Studies courses in Hamilton.

PART A - Advanced Technology Equipment:

The advances in "high tech" equipment varies from area to area. There are some areas in which high tech has advanced by quantum leaps such as in manufacturing technology and electronics, while other areas have evidenced less dramatic advances such as wood-working and electricity (home wiring). Fortunately the market has developed high tech equipment for educational purposes at a fraction of the cost of commercial equipment. This makes it much more feasible for introduction into our school programs.

The following proposal is based on recommendations #10, #15, and #17 of the T.E.R.C report.

1. Manufacturing Technology

. Robotics Trainer *	11	@	$1,000	=	$11,000
. C.N.C. Lathe **	7	@	$6,000	=	$42,000
. Pneumatics Trainer ***	8	@	$3,000	=	$24,000
Total					$77,000

Note: There are 4 lathes + 3 trainers now in place.

This would equip each school with one unit each. This addresses the requirements of the new Manufacturing Technology Course to be fully implemented in September 1987.

2. Drafting Technology

. Computerized Assisted Design
"Auto Cad" 1 @ $13,000 = $13,000

There are now 3 in our system. This additional unit would give us two on the Mountain and two in the Lower City.

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* Robotics Trainer: a robot arm which simulates the use of robots in manufacturing.

** C.N.C. Lathe: a computer controlled lathe which can be programmed to perform various machining operations.

*** Pneumatics Trainer: a unit which illustrates the principals of hydraulics.

3. Automotive Technology

The newer automobiles all have computerized engines and it is imperative that our auto shops have equipment to analyze these engines. The large commercial analyzers cost in the neighbourhood of $30,000; however, there are on the market hand analyzers which do an adequate job and provide the information necessary to analyze the new engines -- cost $1,000 per unit.

. Hand Analyzers 12 @ $1,000 = $12,000

4. Computer Technology

This is a growth program in our schools. Unit costs of logic trainers are approximately $160. Class sets are required.

. 4 class sets of 24 (4 x 24 x $160) = $15,500

Total for "PART A" $117,500

PART B - Conventional Equipment:

1. Frame straightener for Albion Vocational School. This will allow Albion to provide the same program as exists at Parkview Vocational School in Auto Body Repair. $20,000

2. Re location of equipment from Scott Park to Barton. The Machine Shops (2) at Barton are fully utilized but many pieces of equipment (lathes) are out of commission and beyond repair. Scott Park is using only one of two Machine Shops and both Shops have excellent equipment. This should be acted on immediately due to the present state at Barton. $10,000

3. Convert a Machine Shop at Scott Park to a Woodworking Shop. The Principal and Technical Head have identified a need for this facility and also plan on implementing an innovative program in 1987-88 utilizing a number of shop areas, Woodworking being one. Estimated Cost: $50,000
   Addresses recommendations #14 and #15 of T.E.R.C. report.

4. Convert two under used facilities to a multi-purpose integrated shop facility to be used for a general integrated shop program. (2 schools) $20,000

Total for "PART B" $100,000

NOTE: In view of consolidation of program and the introduction of a long range strategic plan in early 1987, the above equipment while needed now is readily transferrable to any school.

PART C - Staff/Personnel:

1. In-service and professional development.
   In collaboration with the office of Staff Development, we need to initiate a plan of in-service and updating for Technical teachers. $45,000

2. Equipment maintenance team.
   To hire a millwright/mechanic for a trial period of one year to provide preventative maintenance for equipment in the Technical area.
   Estimated cost (based on 6 months in 1987):
   These address recommendations #18 and #19 of T.E.R.C. $15,000

   Total for "PART C" $60,000

PART D - Publicity:

1. To cover the costs of developing marketing strategies, producing pamphlets and advertising.

   $2,500

SUMMARY:

This proposal is the first stage in the renewal of an important part of the Hamilton Board's program.

SUMMARY OF COSTS FOR 1987-88 (EST.)

PART A.	High Tech Equipment	$117,500.
PART B.	Conventional Equipment	$100,000
PART C.	Staff/Personnel	$ 60,000.
PART D.	Publicity	$ 2,500.
TOTAL		$280,000

October, 1986

APPENDIX D

MAINTENANCE MILLWRIGHT

Surveys of other boards indicate that there is considerable benefit and cost saving to be gained by contracting a millwright on a per hour basis to maintain and repair shop machinery.

This individual should :

. have a background in machine repair
. have proven knowledge of mechanical components
. have a professional approach to staff and program needs
. have an overview of technological studies in Hamilton and
. the direction of the programs

Terms of employment :

. maintain a regular schedule of maintenance of major equipment
. be on call on a regular basis to repair and overhaul school technological equipment
. provide for pickup for repair and relocation of equipment
. obtain and install parts where necessary

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